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Nuclear Equation of State in the Presence of a Strong Magnetic Field[1] GRANT MATHEWS, IN-SAENG SUH, University of Notre Dame — Strong magnetic fields ($\sim 10^{17}$ G) can exist in the interiors of some neutron stars (magnetars). Such fields can modify the nuclear equation of state through effects of the magnetic pressure and the population of Landay levels by the electrons and nucleons. In this work magnetic properties such as the magnetization and the susceptibility of magnetar nuclear matter are calculated in the framework of relativistic Hartree mean field theory in which the baryons (neutrons, n, and protons, p) interact via the exchange of scalar σ and vector ω, ρ mesons. We find that the magnetization undergoes large de Haas van Alphen oscillations. The magnetic susceptibility then becomes unstable to the formation of *magnetic domains*. This magnetic domain formation can affect the surface properties of magnetars. In particular, the energy released by domain formation is comparable to the observed episodic energy outbursts of soft gamma repeaters (SGRs) and Anoamlous X-ray Pulsars (AXPs) thought to result from magnetars.

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